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ABSTRACT

This issue of the "Carnegie Quarterly" describes three projects that are being conducted by the African Medical and Research Foundation (AMREF). The projects are the following: (1) building community participation in health care at Lake Kenyatta; (2) the role of community education in disease control among the Turkana people at Lokichoggio; and (3) working with the women of Kibwezi to improve food, water, and health. The common theme running through each of these projects is the need to meet the people where they are, to see the situation through their eyes, and to work with them toward solutions, rather than to impose "solutions" from outside. Sources of the project descriptions are given for those who want to obtain more information. (KC)

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Starting Where the People Are: The African Medical and Research Foundation (AMREF)

"The most important advances in health lie in influencing the behavior of the people, and this is a slow battle which will only be won yard by yard."

MICHAEL WOOD, *Go an Extra Mile: Adventures and Reflections of a Flying Doctor* (1978)

"There is tension between the movement that is trying to help African communities develop an awareness of their own needs and potential to work out problems in their own ways, on the one hand, and the aggressive, top-down health care delivery approaches adopted by many donors in response to what they see as threats of enormous magnitude, such as population growth rates outpacing the resources of a country, on the other.

"I still go along with the notion that there is a built-in balance in the structure and vitality of a community, which if disturbed can result in more problems. If you start putting in more bore holes, you can upset the ecological balance, because the land is marginal and can support only so many."

The speaker is Paget Stanfield, M.D., head of the Community Health Department of the African Medical and Research Foundation, based in Nairobi, Kenya. Stanfield, who oversees 20 of AMREF's nearly 60 health education, training, service, and research projects in Kenya and neighboring countries, points to a common dilemma facing public and private agencies that implement development projects in health: how to reconcile the often ambitious objectives of donors with the need of people at the community level to be helped, as Stanfield puts it, "in the natural flow of things."

Too often, in Stanfield's view, the "solutions" to health problems are thought of in terms of health *delivery*—give the people this, give them that. "But people born and working in Africa are sensitive to the need for community participation. They are trying to develop bottom-up approaches with a minimum of cash, using what resources that they have and sharing these with the community, which in turn becomes a resource for 5,000 others."

Fostering change is a slow and difficult process, requiring deep appreciation of the customs, beliefs, leadership, and incentives operating within a particular community, as AMREF has had many opportunities to discover in its management of

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health care projects at the village level. In the late 1970s, for example, AMREF was one of several nongovernment organizations that spearheaded the concept of community-based health care (CBHC) and began testing it in a pilot program in the hope that, if found to be feasible and cost-effective, CBHC and the training and support services needed would become incorporated into the public health system and implemented nationwide.

In cooperation with the Kenyan government, AMREF undertook the training of community health workers within its comprehensive rural health care scheme at Kibwezi. Organized around a health center, which AMREF built in 1980 with funds from the Norwegian government, the scheme combines center-based health care, a mobile outreach service, a mother-and-child health and family planning clinic, and an applied nutrition program. It also acts as a locus for water and environmental development projects in the area and for other experimental programs.

About 180 volunteers selected by village committees, together with 150 traditional birth attendants, have been trained as community health workers over the past seven years. They visit homes, advise families on improved health practices, and refer problems to the health center, among other tasks. While most are still actively working, some of the first trained cadres dropped out of the program when they learned that any compensation they received would have to come from the community. Since then others have participated in the hope that they will eventually be paid.

This has been the rub. After years of "sensitization," the residents still have not given health workers support to the extent of paying them, in money or in kind. The future of community-based health care may well depend on how respective expectations are met.

Even so, there are solid indicators of health improvement among Kibwezi people as a result of CBHC and other preventive approaches taken in the scheme. As one of the health workers commented, "People used to just die. But now people are not dying." Health workers, who are being characterized as the first line of defense in the Kenyan primary health care system, also point to a new optimistic spirit taking hold in the community — a spirit that was formerly "left behind," as another put it.

Although the cost-effectiveness of CBHC, and of the Kibwezi rural health scheme of which it is a part, is still unproved, this does not, in Stanfield's view, detract from the importance of continuing to test and refine the concept. With a population growth rate of 4 percent a year and declining per capita income, Kenya cannot hope to provide adequate medical services to all its people. Its citizens *must* be helped to become more responsible for safeguarding their own health, and CBHC may be a crucial building block to this end.

AMREF was co-founded in 1957 by a British surgeon named Michael Wood and two other plastic and reconstructive surgeons, who saw the advantages of using small aircraft to extend surgical and general health services to the remote "bush" country of Kenya and Tanzania. "Through being a 'flying doctor,' I got a sense of the magnitude of the problems," said Wood, who was director general of AMREF until the end of 1985, when he retired.* "After a year or two we saw there was no way we could improve the health of the people, given the economies of the countries we were working in. We realized something had to be done about people's health *before* they needed clinical services. We needed to help them see the cause-and-effect relationship between their behavior and their health."

Not long after AMREF launched its "Flying Doctor Service," for which it is still best known outside Africa, it decided to add new programs emphasizing education and behavior change to promote health. It began to offer in-service training and continuing education to nurses, technicians, and other allied health personnel working in rural areas. Said Wood, "The reality is that it is still better to train ten people to look after others than to have one doctor work ten times as hard." Training and the training of trainers led AMREF into the production of health learning materials, which are now used all over East Africa and other regions by health ministries and nongovernment organizations.

AMREF has continued its flight program through teams of "flying doctors" and nurses, keeping in contact with 100 bush clinics through its network of high-frequency radio transmitters. It also operates a mobile ground unit in Masailand, which, with its strategy of combining treatment with health education, has nearly succeeded in controlling trachoma. Commented Wood, "One needs to maintain a balance. People won't listen to you until you seem to be delivering health services."

"Finally, " said Wood, " we felt we should be carrying out medical research. So often the answer to specific diseases is found in the laboratory rather than in the practice of medicine." AMREF now has a well-equipped laboratory in Nairobi, which is dedicated to the control of selected endemic diseases. Additionally, because of its emphasis on improving the general health of populations, rather than on treating the individual patient, AMREF staff is working with communities on improved water supply, sanitation, agriculture, and nutrition. "Deficiencies in these areas lie at the heart of many disease problems in Africa," said Wood, "yet they have nothing to do with antibiotics or hospitals."

AMREF's 600-member staff of doctors, nurses, researchers, technicians, and others, most of them African, undertake projects in cooperation with government ministries of health and often at their behest. Supported by public and private sources, the organization has received major grants from Carnegie Corporation to strengthen its expertise in health education, field research, and project evaluation. The rapid growth of its operations during the past ten years has admittedly subjected AMREF to some growing pains and at times required it to educate the donors to the possibilities as well as human constraints of village-based health projects.

The following articles cover a few of AMREF's activities in Kenyan communities, illustrating the complexities and paradoxes involved in trying to change behavior to promote health.

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* Sir Michael Wood, who was knighted by the British Crown in 1985 for his contribution to African development, died on May 16, 1987.

Lake Kenyatta:
Building Community Participation in Health Care

Dr. Jane Carter has charge of the diagnostic laboratory set up at Nairobi headquarters to further AMREF's research in malaria, sleeping sickness, leprosy, kala-azar, and hydatid disease. An internist who came to Kenya from Canada in 1986 armed with a pilot's license, she was hired instantly in the Clinical Services Department as one of the five "flying doctors" periodically providing general health care in remote areas. Recently, she has been helping to set up low-cost diagnostic laboratories in selected rural health centers.

"Most medical problems can be identified with a few diagnostic tools," she maintains, "but many health centers or dispensaries are so poorly equipped that virtually no diagnostic work is being done." An AMREF study of the Kibwezi health center revealed, for example, that more than 80 different drug combinations were being employed in the treatment of "malaria" without benefit of microscope or blood slide.

A consequence of wrong diagnosis and the overuse of drugs is that certain diseases are becoming resistant to standard treatments. Urinary infections, which are widespread, are no longer susceptible to tetracycline in some parts of the country. The temptation in endemic areas is to treat any headache or fever as a symptom of malaria. As the growth of chloroquine-resistant malaria testifies, the practice can be dangerous.

To tackle the problem, Carter has developed a laboratory kit that can be used by technicians in most dispensaries and health centers. "For diagnosing malaria, schistosomiasis, and worms, labs don't need much equipment," she says. "Basic observation tests will solve 99 percent of the diagnostic problems. It's nice to get a culture and to have biochemical apparatus, but those patients that are very sick can go to hospital."

One health center that Carter is assisting is located in the coastal district of Lamu, incorporating the Lake Kenyatta Rural Settlement Scheme. Settlement schemes have been used by the Kenyan government since independence to provide land for the destitute peasantry. At Lake Kenyatta, families are offered ten-acre lots on condition that they farm. Little more than 15 years in development, the settlement is now about 70 percent occupied by a mixed population of 17,000 people from other parts of Kenya. About 85 percent of the inhabitants are Kikuyu, but there are also Kambas and Luos. Ironically, the indigenous Bajunis and Giriama, Muslims who make their living through trade, do not elect to join the scheme. Earlier experiments to include them failed when they did not make use of the land.

Recognizing Health as Part of Development

Although the settlement scheme is government-sponsored, infrastructure development has been financed and managed almost wholly by the German aid agency, GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit). GTZ has spent millions at Lake Kenyatta on road and water development, but only recently has it come to realize that health care should be

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a major concern. In 1986 it engaged AMREF's Evaluation and Research Unit (EVARU) to carry out a health needs assessment of the scheme and surrounding community. The mandate was to study the health problems, the environmental and social factors involved, and the state of existing services and make recommendations for improvements.

What EVARU consultants found is disturbing but not unexpected for an area that combines high aridity with large tracts of bush and swampland. Malaria is reportedly the most serious and widespread disease, although lab film tests conducted by AMREF physician Christopher Nevill found a low prevalence, in part, he believes, because the lake's fish eat the mosquito larvae. "But since the tests were done in the dry season, a comparison test will be done during the wet season to see whether the initial test results stand up. If they do, there is a serious problem of misdiagnosis of malaria, meaning that other diseases causing fever and malaise are going untreated."

About 5,000 children live in the settlement, and there are 12 primary and 5 nursery schools. Sixty percent of a sample number of primary schoolchildren were found to have schistosomiasis, and there was the usual spectrum of childhood diseases, such as diarrhea (the fourth most reported illness), intestinal parasites, and upper respiratory infections.

More worrisome, however, was the condition of health services. The health center at Mpeketoni, which has about 16 beds, was in an advanced state of disrepair with a demoralized staff. There was no laboratory. The one vehicle provided by the Ministry of Health had long ago broken down. There was no electricity or working radio or other communication system. And while patients with serious illnesses continue to be referred to the district hospital, this is hardly a solution. The hospital is many kilometers away, imposing a special hardship on a community that has few *matatus*. (*Matatus* are privately owned vehicles used for rural transportation.)

The Sisters of the Sacred Heart of Malta operate a mission at Mpeketoni with a mobile outreach service that provides both curative and preventive care and has immunized about 85 percent of the children. The Sisters also train community health workers, each serving about 20 families in the scheme.

But this has been the extent of formal health care in the immediate environs. In the informal system, there appear to be few health practitioners, such as midwives and traditional birth attendants (TBAs), because the settlement is new, and patterns of self-help and mutual assistance have not yet been reestablished. Most children therefore are born at either the health center or district hospital, unusual for a rural area.

Implementing Change

After reviewing EVARU's report and recommendations in late 1986, the GTZ staff saw that strong measures would be needed to rehabilitate health services around Lake Kenyatta and, further, that improved services would have to be coupled with effective health promotion strategies to keep the patient load to a manageable level. It asked AMREF to help implement its own recommendations for meeting these two goals.

Working with relevant government ministries, including health, sanitation, and lands and settlements, GTZ is now financing the expansion and management of the Mpeketoni health center and its operations, with AMREF staff supervising much of the work under a three-year contract. Not only Lake Kenyatta but several adjoining communities will benefit. Jane Carter, in consultation with local public health technicians, is helping design and equip two new laboratories: a DVBD lab (Division of Vector-borne Diseases of the Ministry of Health) to carry out health surveys, and a clinical lab for the treatment of individual patients. Other measures include repair of the radio equipment and health center vehicle and installation of solar power panels to provide lighting. (Solar energy is initially costly but requires little or no maintenance.) In addition, plans are to introduce a school health program to test all students for schistosomiasis and malaria and ensure that children are immunized against major infectious diseases. A community-wide campaign is already under way to build pit latrines.

Lastly, AMREF is trying to build support for vigorous child care and family planning services. The EVARU report recommended increased outreach services and the training of more community health workers to supplement the efforts of the Sisters of Malta. Traditional birth attendants often feel intimidated by medical personnel and tend to avoid health centers unless accompanying a patient. One objective is to bring about closer cooperation among TBAs, community health workers, and the health center nurses in the care of mothers and children.

A difficulty nationwide is the lack of reliable data on maternal and child mortality. At Lake Kenyatta, for example, abortions and stillbirths are not reported. Some maternal deaths are not reported. EVARU has developed a notification form that local health practitioners can use to monitor all births and deaths.

A nettlesome issue concerns the relationship of AMREF's

change efforts to the Catholic sisters' project, which is funded by Oxfam. According to Njeri Mukoma, AMREF's coordinator at Lake Kenyatta, "The Sisters are concerned about AMREF's role and its intention to educate people in the use of 'artificial' means of birth control. The Sisters teach 'natural' methods and tell people that any other method is bad for their health—and sinful."

Meetings have been held between AMREF staff and the sisters to try to sort out their differences and come up with a solution that is mutually acceptable. Says Mukoma, who is a former public health nurse, "The tensions point to the need to bring together all the actors involved in the settlement scheme—government, the nongovernment organizations, the Catholic sisters, and AMREF—to see how health care delivery can be more rationalized and to clarify roles and responsibilities."

Bringing in the Community

The settlement has a hot climate, but the soil is rich, and the diet of the people considered adequate. It is one of the few places in Kenya where the people store food for the rainy season rather than the dry, because the mud cuts off all supply routes. Clean water is often hard to find.

As elsewhere in the country, many common health problems are preventable through better hygiene and sanitation. While public health measures are called for, there is much, says Mukoma, that people can do in their own homes to protect their health.

A major obstacle to self-help at Lake Kenyatta "is not so much lack of money as lack of knowledge and visible reason to change living habits," says Mukoma. Only about half the residents have latrines. "People do not see the sense of latrines when the whole outdoors is available to them. Even when families have built a pit latrine of some sort, they use the open fields when they work in their *shambas* [plots]." (Some studies show that this practice in a dry environment does not pose a health threat.)

Low priority is placed on the quality of housing. Most huts are made of sticks, mud, and thatch, which may be one reason settlers do not want to invest in ventilated latrines of cement and stone. Just one bag of cement costs 100 Kenyan shillings (roughly $6.00), and the stone has to be brought in. The people ask, "Why should I spend a lot of money on a pit latrine when I am being bitten by snakes in my own house?" (One aid project not involving AMREF or GTZ called for building spiral cement-walled latrines. These were placed near the health center as a demonstration. The latrines were pitch black inside. People were bitten by snakes and in their terror could not find their way out. The latrines still stand as a neglected monument to misguided good will.)

Comments Mukoma, "The issue of the latrines is only one of many examples of ideas brought in from the outside that are often unsuitable for the conditions in which people live. That is why it is so necessary to consult on solutions with the people themselves."

Coming up with good ideas to solve problems is not easy, as Nicholas Greenacre, head of AMREF's Environmental Health Unit, knows from experience. Greenacre helps villagers build wells and waste disposal systems that are affordable and easily maintained. "Most good ideas are specific to a community," he states. "Each place is different. What works in one place is not always transferable knowledge."

At Lake Kenyatta he ran a training course in community health and latrine construction and, at the request of GTZ through the Ministry of Health, designed four types of latrines that appeared to be suitable for the sandy, unstable, terrain, "all made of materials that the settlers can find free of charge on their *shambas*." Those the people built, however, did not meet AMREF specifications. "Flak came back," says Greenacre. "The latrines in the village were collapsing."

Mukoma advised AMREF to give up the idea of persuading people to use pit latrines and settle for a type that would last about two years. She consulted the village health committee, which suggested sinking empty oil drums. "We found that we could get some from Lamu for about 50 shillings apiece. We have ordered 180." Initially about 20 families will be trying them out.

Perhaps Mukoma's greatest task as coordinator of the health project has been to foster a spirit of cooperation among the residents. "People don't feel like they belong to each other here. It's everyone for himself. It's a problem."

She adds, "The dependency syndrome can sometimes take over in these big assistance schemes, in part because there has been insufficient consultation with local groups from the start. GTZ moved in with its big technology, its tractors and machine shops, and built roads and brought clean water closer to the people. Now it is beginning to see the need for consulting people on their own priorities and following up."

Donors, she also suggests, "are going to have to understand that when it comes to working with people, you can't have rigid targets. Some results are not measurable, because the change process involves attitudes and such intangibles as how people wish to use innovations."

Knowing how to work well with the various bureaucracies and being patient are important, Mukoma observes. "Just getting the design of the expanded health center to include the two labs has taken three months. Permission to have the labs must come from the Ministry of Health, but the Ministry of Works must authorize someone to design the building and the rooms. The initial plan was unsuitable. We wasted a lot of time because of this. But if we don't go through the ministries, the government won't maintain the building.

"One good thing has happened, though. People have begun to understand the idea of development and seem to be settling in to stay." Formerly, says Mukoma, "they would have moved in for awhile, and then once life became hard would move on. That's not happening any more." ■

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Lokichoggio:
The Role of Community Education in Disease Control

The chief health "educator," Edward Etot, is perched on a carved wooden stool that is part of the basic armamentarium of pastoral Turkanas. About him on the trodden earth are 30-odd men and women and a gaggle of excited children. Many are victims of hydatid disease, their bellies swollen grotesquely from the cysts of a species of tapeworm called *Echinococcus granulosus*. Edward is chanting one of the hydatid prevention songs the group knows well:

Dogs, dogs eat everything.
When they eat hydatid cysts, they get tapeworms.
They bring disease—they bring hydatid.

The group repeats the lines after Edward amid energetic clapping and ululation:

This disease has killed all of us Turkana.
Hydatid is what killed us.
It has killed our children.
It has killed our women.
It has killed our men.
It has killed our livestock.

Edward then delivers the punch line: "Prevent this disease—don't give cysts to the dogs!" They repeat after him, "Prevent this disease—don't give cysts to the dogs!"

The lyrics to the "life cycle" song identify a crucial stage in the transmission of the deadly parasite, which afflicts upwards of 15 percent of Turkana people in this remote, northwestern section of Kenya. Grazing livestock ingest tapeworm eggs excreted on the ground or in water by dogs. The hatched eggs become trapped in the small capillaries of an organ and form a mass of spherical cysts. When the Turkana kill their livestock for food, they cut out the cysts and throw them to their dogs. The dogs' mastications break up the cysts, releasing fertile larvae that evaginate in the stomach, whence they pass to the small intestine to grow into egg-laying adult worms, starting the cycle again.

Turkanas, a Nilo-Hamitic people related to the Masai, keep dogs for security. Livestock are their main source of wealth and prestige, and cattle stealing among rival clans is a way of life. When the men and boys go off with their herds of cows, oxen, sheep, goats, or camels in search of pasture, they leave the dogs behind to protect the women and young children. These sturdy, short-haired canines are important companions as well as guards and are often given free reign of the homesteads. But their fur may be covered with millions of microscopic eggs, which are picked up by the hands as the dog is petted, brought to the mouth, and unknowingly swallowed. Often lacking water, the mother may permit the dogs to clean their babies' bottoms. Eggs may be all over the dog's muzzle. More eggs fall on the cooking utensils that litter the ground. Eggs can be in the drinking water drawn from unprotected sources.

By all of these routes, *Echinococcus granulosus* gets into the human body and grows into large cysts, usually in the liver but also in the kidney, lung, brain, and eye. The affected organs become distended and impaired, causing protracted suffering and eventually death.

Hydatidosis has a worldwide distribution, occurring in Iceland and Cyprus, among the sheepfarmers of Australia and New Zealand, and among native Americans. "It is most highly prevalent among the Turkana," says Dr. Calum Macpherson, field project leader of AMREF's hydatid research and control program based at Lokichoggio, in Turkana district. "Turkanas keep many more dogs for security than other pastoral people, especially near the Ugandan, Sudanese, and Ethiopian borders where there is a lot of fighting and cattle raiding."

In this arid region of bald mountains, plains, and few roads, the physical dangers are real. Years of civil and military strife along the three international borders have yielded the Turkana an easy supply of A.K. rifles and other modern weaponry. The people no longer raid livestock with spears but with bullets. The dog population has gone up accordingly, as has the incidence of hydatidosis.

Says Macpherson, a parasitologist and epidemiologist born in Kenya, who has worked seven years in the AMREF project, "If the Turkana quit feeding their dogs infected meat, the cycle would be broken." But stopping such a practice, when even the most literate Westerner may not quit cigarette smoking or alcohol abuse unless spurred by the fear of imminent death, may be asking too much of a people who still live largely according to customs laid down centuries ago, A.K. rifles notwithstanding. Macpherson acknowledges with a rueful smile that, "Even though the people love to sing the hydatid prevention songs, and the words have diffused as far away as Lake Turkana, we still find people throwing cysts to the dogs." No wonder, when there is little else to feed them.

AMREF's team of researchers, veterinarians, and locally trained health educators are nonetheless making headway in their efforts to interrupt the grim life cycle of the tapeworm. The first monumental hurdles have been crossed: to help the people understand the cause of the disease — no mean task when the worm under high magnification at first is taken as its real size. More important, the project team has gained the people's confidence, support, and participation, convincing them that their own dogs are carriers of the disease and persuading them to have their animals dosed, spayed, or killed as control maneuvers.

First-stage Research

Before AMREF began work at Lokichoggio in 1976, not even the scientists were sure how the tapeworm was transmitted. Until the 1950s, very little was known about hydatidosis in Africa at all. As Macpherson puts it, "Dogs were on the list of suspects, but so were other carnivores, such as jackals."

AMREF's involvement in hydatid research began through Michael Wood, the organization's co-founder. During his surgical rounds in Turkana district in the 1950s and 1960s, he was operating on hydatid cases every month. "It was he," says Macpherson, "who originally noticed that surgical removal of the cysts was not affecting the incidence. People just got the disease all over again."

He adds, "The current surgeon at the district hospital in Lodwar is so disillusioned over the post-operative recurrence and reinfection rate that he refuses to operate on hydatid cases any more, even though surgery is still an important method of treatment."

In 1963, a clinician and parasitologist, Dr. George Nelson, examined the first dogs in the district, and he found the parasite. But it was not clear whether dogs were the main transmitters to humans. Says Macpherson, "The original purpose of the hydatid research project was simply to explore where the disease was coming from, whether from jackels, hyenas, or dogs, and then to find out the method of transmission."

When he took over from Dr. Marcus French as head of the project in 1983, Macpherson did most of the work on carrier identification, in the process examining hundreds of carnivores. The evidence was conclusive: While the jackal played a small part, the definitive host was the dog.

Using ultrasound scanning, Macpherson and his team also examined almost half of the people residing in the project area and discovered that at least 10 percent had the disease. This represents almost one person in every family. Women and children were the most seriously ill, having twice the infection rate as men. Unfortunately, ultrasound -- a technique that the Turkana find fascinating and enjoyable to experience — cannot detect the disease in sites other than the abdomen. "Only X-ray will find it in the lungs or elsewhere, and we haven't that technology yet," Macpherson says. "So the probability now is that the prevalence is much higher."

The next step was to investigate how dogs transmitted the worm to humans. Observational studies of Turkanas' interaction with their dogs revealed why women and children seemed so vulnerable to the disease. Most dogs were found to spend more than three-quarters of their time with the women and young girls in the homestead, often in the huts, while the boys and men were out herding livestock, an activity that does not involve dogs.

Education as a Long-term Strategy

From 1983 to 1986, the main purpose of the hydatid project changed from research to pilot control, most recently supported by the Leverhulme Trust. This phase has employed two different strategies. The first, dog surveillance and control, has had immediate effect. The other, education, will take a long time to have measurable effect, but it will provide a cheaper and more durable solution to the problem, Macpherson believes. "Just a few years ago, there were six to eight thousand dogs here. To achieve a rapid break in transmission of the disease, we worked with the government veterinary department to destroy all stray dogs and to register those wanted by the people. All wanted dogs are supplied with color-coded collars and are dosed every six weeks with praziquantel, a new taeniacide that is 100 percent effective in removing the adult parasite. As many female dogs as possible have been spayed." The dog population is now down to about 150 — less, however, from the control program than from the effects of a severe drought in the early 1980s, which drove many Turkanas into feeding camps and left the dogs to shift for themselves.

Dogs are also purged and blood samples are collected. Purging determines the number of dogs that gain access to cysts and therefore indirectly measures the probable incidence of the disease in livestock and the progress of the parasite through the cycle. If worms are passed in the purge, says Macpherson, the implications of owning an infected dog can be stressed to the owner and everyone else present. "An infected dog left undosed could potentially infect a whole village."

But dog dosing and control, which now have the full support of the local people, are expensive, and kill only the adult worms, not the cysts, which can live in humans up to 50 years. Stray dogs continue to infiltrate the control area from outside.

At the beginning of 1985, dust storms followed by exceptionally heavy rains caused a major setback in the control program and underscored the limitations of dog control. Large sections of the project area became impassable, and the subsequent flush of grass encouraged many settled Turkanas to return to their nomadic way of life. Stock raiding resumed with a vengeance, forcing thousands of Turkanas to flee to the relative safety of the district's interior. People acquired more dogs for security, beyond the reach of the project.

Dosing as a long-run strategy is therefore unworkable. "The main hope of controlling this disease is through effective education to prevent dogs from eating infected tissue and to decrease the amount of human-dog contact," says Macpherson.

In 1983, a new approach was taken to education. In other countries, books have been used, but these are meant for a literate population, and only 1 percent of the Turkana are literate. The new approach includes the use of visual and aural aids, including illustrations of the worms, flip charts, and preserved cysts. Poems, plays, role-playing, and songs featured at group meetings are also a vital part of the education program.

At first the project engaged health educators from Nairobi but soon switched to training Turkanas who are known and accepted by the people. Edward Etot learned English in a local Protestant mission school. He became attached to the project as a translator for the nonlocal members of the research team. (Macpherson himself gets along quite well in Turkana.) Now senior officer and lead educator, Etot has since been joined by seven other Turkanas who are paid members of the staff, working when they themselves are not off herding. Explains Macpherson, "They try to keep people from throwing the cysts to the dogs. They show people that they must erect barriers to keep dogs away from the water which humans drink. They ask people to wash their hands before eating, to boil water from unprotected sources, and to use dishracks—measures, incidentally, that help prevent other health problems related to poor hygiene.

"But other things are harder to achieve. The Turkana don't bury their dead. Dogs and jackels may eat the corpses and perpetuate the cycle that way. It is very hard to get people not to let the dogs lick the baby's bum, when there is no water for washing. Most people have agreed to have the stray dogs killed, to have their infected dogs killed, to have the females spayed, and to have the remaining dogs regularly dosed. But the intimate contact between person and dog is very difficult to break."

A single educator will be responsible for as many as 20 families scattered far and wide, and to find them at the right time is a challenge. "In the dry season, when people and cattle gather around the water holes, you can reach many at once," says Macpherson. "But this is a hardship time and they may be less willing to listen to messages about hydatid prevention. People are more receptive to education in the wet season, when the living is easier. But then they are harder to find." To help them go where the people are, the educators have been given donkeys for transport during the two wet seasons a year.

The Impact of Treatment on Behavior

Treatment was not part of the original project design, but experience has demonstrated that it can be a powerful reinforcement to education; so it has been added to the education strategy in the third phase of the project beginning in 1987.

In the late 1970s, Dr. Marcus French tried out a chemical alternative to surgery called mebendazole, which was not very effective and had bad side effects, impairing kidney function. Its use was therefore discontinued in Kenya. Around 1983 a related substance called albendazole was tried and found to be well-absorbed by the body. "You get a high concentration of the drug in the cysts," says Macpherson. "In all but a few patients, the drug breaks down the cysts and kills the larvae inside." Since 1984, 47 severely infected patients have been sent for chemotherapy either to Kenyatta Hospital or to the Kenya Medical Research Institute (KEMRI) in Nairobi. (KEMRI's clinical research center specializes both in hydatidosis and kala-azar, another fatal disease, caused by a protozoan parasite.)

"The returning patients who have been treated have proved to be excellent educators," Macpherson attests. "They are highly motivated themselves to avoid reinfection, and they are visible proof to others that freedom from the disease is possible through treatment and, more important, through education."

But continuing to send patients to Nairobi has proved impractical. Turkanas suffer culture shock in the big city and are deprived of contact with their families for as long as six weeks. Treatment on site presumably avoids such traumas and aids in the recovery process. The Red Cross, which has just finished building a new hospital at Lokichoggio to treat the war-wounded from Southern Sudan, is devoting one wing solely to chemical treatment of hydatid cases. Current plans are to take in about 30 patients a month starting in August 1987. "From an educational point of view," says Macpherson, "the project should really take off then. Before, people would see the dogs being dosed and say, 'But what about me?' "

Not all patients respond well to albendazole. Macpherson and his collaborators, Dr. Gideon Okello and Dr. Ibo Were, physicians working in Kenyatta Hospital and KEMRI, respectively, will conduct research on praziquantel, the drug used in treating schistosomiasis and the adult tapeworm in dogs. "Until recently," says Macpherson, "it was thought it would have only minimal effect in the treatment of hydatidosis, but new *in vitro* tests are very promising. We are going to reexamine the situation to see how well it works in people."

The pilot control program ends in June 1987. If it proves successful, surveillance and control will be expanded to the whole Turkana district of 140,000 and, it is hoped, to the neighboring countries where hydatid disease is also endemic. One day people may find they no longer have to endure patiently one of the most vicious diseases nature has yet devised. ■

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Food, Water, and Health: Working with the Women of Kibwezi

Between Nairobi and the Indian Ocean is a division of the Machakos district called Kibwezi. A vast stretch of scrub land punctuated by giant baobab trees, it was once part of Tsavo East National Park. Most of the people there make their living from subsistence farming and a few head of cattle and goats. Their thatched mud huts are widely dispersed because the volcanic soil is only marginally productive. The rains fail to come in as many as six out of eight seasons. From 1983 to 1985 the drought was so severe that massive food assistance was needed to avert starvation and nutrition-related diseases, particularly among the children.

Kibwezi division has been settled voluntarily over the past 25 years by Kamba-speaking people escaping population pressures from the northern part of the district. Occasionally whole families have moved down in the search for arable land, carrying the name of their ancestral village to their new home. Some residents were born in this area, but the majority have arrived within the past 10 to 12 years. The population now stands about 150,000, growing an estimated 8 percent a year —twice the national average.

Arid and semi-arid environments like Kibwezi comprise about 80 percent of the land area of Kenya.* Besides the unreliability of the rainfall and frequent crop failure, there is little formal employment or income-generating activity. Bus service is irregular over the circuitous, rutted roads. Some parts of the division are spring- or river-fed, allowing irrigation and the commercial growing of crops, but others are a good two hours' walk to the nearest source of water. Not surprisingly, it is in these water-deprived areas, where sanitation and hygiene have low priority, that children suffer most from infections and intestinal parasites. Moreover, drug-resistant malaria has emerged to attack the young. In 1980, the date of the last census, such health problems caused 125 deaths per 1,000 Kibwezi infants under the age of one, well above the 92 per 1,000 for Kenya as a whole.

But Kibwezi residents are resilient. Ethnically homogenous, with a long tradition of self-help and community cooperation, they are generally young — the median age is under 15 — and most people have some basic education. Attendance in primary school is high for both boys and girls; 75 percent of the children have been immunized against whooping cough, measles, polio, diphtheria, tetanus, and tuberculosis.

As Kibwezi has been settled, many women's groups have formed to improve the welfare of their families, and AMREF has begun to facilitate the efforts of a few. "We felt that whatever help we could give them would be worthwhile," says Robina Biteyi, head of AMREF's Nutrition Rehabilitation Unit based at the Kibwezi health center that AMREF built.

*Only about 18 percent of Kenya's land is arable. The heaviest concentrations of people are in the west, around Lake Victoria, in Nairobi and the central highlands, and in the coastal strip around Mombasa.

The wonder is that the women of Kibwezi find any time at all for cooperative endeavor. As Biteyi points out, "Women have a heavy work load. They grow all the food for the family. They get the water. They take care of the children. They do all the household chores." They have learned, however, that by working together they can increase their productivity and spread the benefits across all the members of the group.

One group formed in 1982 is run by a committee of seven chaired by Christina Musili, a young woman whose proud bearing reveals great strength of will. The members devote two days a week to farming and other enterprises. "We first dug a well," she reports in Swahili, translated into English by Biteyi. "Then we started a poultry enterprise with 45 hens. At that time we were 60 women who came from eight villages. But all the hens got sick and died. When that happened, many of the women gave up, and we went down to 35. From there we started preparing one-and-a-half acres to farm. We had a good harvest: 94 kilograms of cowpeas, 27½ kilograms of green grams, 10 kilograms of beans."

Seeing their success, one of the men of the community donated ten more acres for the women to work. (While the land at Kibwezi is held in trust by the government, men have control over its use.) "Usually," says Musili, "a good harvest has been six to eight bags of maize per acre on marginal land. But with assistance from Susan Kulobya [an extension agent on the unit staff], our yield was increased to 45 bags in some parts of the land. Our food can now be seen in the store.

"We also have two beehives. And we have prepared about 3,000 bricks for building a poultry house for more hens. From there we have decided to have a maize mill to generate income."

It costs 500 Kenyan shillings (about $30.00) to join the group, according to Musili, who says the profits are put into a bank for use by the members, after a request for help is considered. "If one of us has a child and she cannot pay the school fees, she can borrow from the bank, then she pays the money back. If one of the members falls sick and there's no money to see her to hospital, she can borrow the money from the bank and slowly refund it. If one of the group has no husband or has no home, we help her build a home.

"We do all this," she says, "because we are prepared to see that this sublocation is improved."

Says Biteyi about AMREF's role, "We chose this group to work with because it is active and really trying to achieve something. When they have been unsuccessful it has been due to circumstances beyond their control. So the first step we took was to mix with the women. What were they doing? What were their priorities? What were their plans? What did they need?

"It was the planting season. They thought it would be a good idea to start with food production. They took us to their *shambas* [plots] and told us what they wanted to grow. They didn't have seeds, so we gave them seeds on loan. The agricultural

extension agent showed them good farming methods. They got high yields. For example, they were given only two kilograms of cowpea seeds, but they got more than 90 kilograms of harvest. We told them that was a good yield, and we asked them to pay us back by choosing another women's group and giving *them* the two kilograms of seeds.

"Then we began to concentrate on income-generating activities. The women have to walk long distances to have their maize milled and have asked for a milling machine. We told them that if they raised half the money required, we would consider loaning them the other half. We are trying to arrange a *harambee* [community fundraising] meeting for them now. The government has agreed to give them the training to operate the machine. If they get the machine, it should take them about three years to pay back the loan."

Food is Medicine

The Nutrition Rehabilitation Unit came into being in 1984 during the height of the drought, when 40 percent of Kibwezi's children were found to be malnourished, 15 percent of them severely so. The unit is supported by the William Penn Foundation. "A program to feed the under-fives was started at the health center," says Biteyi. "Every day it was visited by many families needing food assistance. The children were weighed and given dried skim milk, oil, sugar, and maize meal. As conditions improved and more food was available, we tried to avoid dependency, so we ended the program in 1985."

When AMREF carried out its health assessment of the Kibwezi division, sampling families from almost every sublocation, the unit staff began to realize, according to Biteyi, that "much of the malnourishment was not from the drought but was caused by social reasons: the heavy workload of the mothers, the early weaning of babies, nutritional beliefs, the inefficient practices in food storage, and so on.

"So we decided to continue the nutrition program but focus on nutrition education. Then we added education about food production, food preservation, and income-generating activity."

She adds, "The program still provides food assistance to severely malnourished children. So far this year, the unit has admitted 23 with their mothers, who are taught how to prepare healthful meals and participate in discussions and problem solving. They stay at the center two to three weeks. When they go home, they are followed by the health center staff and community health workers. When we find a child is still at risk, we continue to follow up and request that the child be brought in for weighing and assessment."

The problems of malnutrition vary from village to village and family to family, and the AMREF staff is looking into specific causes. "In some families, there are taboos that prevent people from using certain foods," says Biteyi. "But a lot more needs to be known." A graduate student attached to the unit is carrying out research on the socioeconomic determinants of malnutrition in the area.

Biteyi and her colleague Kulobya initially visited homes and consulted the women about their nutritional needs. "They told us they wanted to know more about infant feedings. So we decided to concentrate on weaning foods and growth charts."

The weaning period is a dangerous time for many infants. Although almost all Kibwezi women breast-feed, mothers typically start weaning their children on a diet only of thin porridge. "This deprives them of proteins and vitamins, so that by the time they are weaned," says Biteyi, "they are already malnourished." She further notes the custom of giving children only two meals a day. "We think frequent small meals consisting of available nutritional foods would help.

"Quite a few children are admitted to the center with measles, whooping cough, and diarrhea, and we find out that the mothers stop feeding their children when they fall sick. We suggest that the mothers continue feeding the child during this

time, and we teach them oral rehydration therapy to deal with diarrhea.

"We are also concerned about the nutrition of pregnant mothers. Through the mother and child health program and the mobile outreach service at the Kibwezi health center, we have introduced an 'MCH Card' to monitor the weight gain of the mother as well as her general health and family history. Many women suffer from anemia, which is a major cause of low birthweight in newborns. The card is kept at home by the mother, who also uses it to monitor her children's growth and health."

Relating Water Development to Health

Through AMREF's Environmental Health Unit, headquartered at Nairobi, Nicholas Greenacre is working with two other women's groups in a well building program at Kibwezi. The people organize the work and provide the labor under the guidance of a local water committee, which identifies the site. AMREF provides the tools, installs the pump, and offers the technical training in maintenance. The group that builds the well owns it and decides who and under what terms others may have access to the water. This limits overuse.

Some women who formed a group dug a 50-foot well by themselves with whatever implements they could lay their hands on. The men stood by watching, making fun of their efforts. When the well was finished, the women named it *Kumina ngwi*, which means "stop laughing" in Kamba.

"The impact of our water program is being looked at right now," says Greenacre. "We expect reductions in the cost of water per liter and in labor, and we hope for improved health. But the actual benefits are hard to calculate. We know there is a major reduction in the distance to fetch water, but it doesn't reduce labor *per se*, because the women spend the time saved working at something else.

"The well is certainly improving the quantity and quality of the water, but probably not to the level of improving hygiene. If you get ten liters of water instead of five, is there an impact on hygiene? Our expectation is that there will be only a marginal effect for that amount of water. People are still not going to waste water washing themselves."

He speculates, "If they could tap the water supply that goes to Mombasa, there would probably be improved health care. As it is, the land being marginal, there is a danger of overgrazing. I prefer many low-yield wells to limit their use."

Thus far AMREF has assisted in installing about 30 wells at Kibwezi, each serving about 2,000 people. What AMREF with government agencies is trying to do now is determine how many more wells the land can support. "The eastern part of Kibwezi is drier. There are no rivers. When the community tried to hand-dig a well there, it couldn't find enough water to pump. So there are certain areas where AMREF cannot even respond," says Greenacre. The environmental unit is therefore working only in those sections where the water table is fairly high. "This means the number of wells we build will not be significant for the community as a whole."

Preparing for Hardship

Some soil conservation and crop management are being carried out at Kibwezi, but as Greenacre points out, "There are limits to what people can grow because of the risk of crop failure during the dry season."

AMREF's nutrition unit almost perforce became involved in food production and storage, because, explains Kulobya, "we found that if we are to advise mothers how to feed their children, they have to have enough food."

Coping with the intermittent rains and laying by enough food in the event of drought takes planning. Kibwezi residents, like farmers elsewhere, tend to sell off a large portion of their crop during the rainy season when the prices are low, then buy at high prices during the dry season. Says Greenacre, "This can mean that people have neither enough money nor food to carry them over during hard times." Also, as a rule, families will not slaughter their animals, even during a drought, because livestock are their basic capital.

Another problem Kulobya observes is that "people often plant late, because they don't want to prepare the land until they know whether the rains are coming. But then their yields are low. Food storage systems are poor, and there are high losses from pests. Seeds get damaged by ants, weevils, rats and other vermin."

Kulobya, who was trained in the Ministry of Agriculture and liaises with the extension system, comments, "People are really keen on agricultural education. But there are not enough agricultural extension agents to meet the demand. We assist their work by holding seminars and training sessions for health workers, school teachers, and others in the community who can educate the people about the links between food and health. Then we try to see whether families are utilizing the knowledge and if not, why not."

Kulobya listens to people's questions and then addresses their concerns, often through demonstration. Community health workers, for example, complained that chemical preservatives were too expensive. But it came to light in conversation that farmers frequently were given improper directions by the local shopkeepers. As a result, an entire box of the preservative might be poured into a sack of corn, when only a teaspoon would suffice. Kulobya was able to explain the right use of the chemicals as well as make other practical suggestions in conserving food and controlling pests. She also works with shopkeepers, making sure they have the proper information to pass on to farmers.

In these and other ways, the AMREF field staff tries to respond to people seeking answers to problems that they themselves identify and for which they ask assistance compatible with their everyday patterns of living. Achieving good rapport with the women may well be essential to the success of village-based projects concerned with health. ■

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STAFF NEWS

In April, Patricia L. Rosenfield joined the Corporation as a program officer in the grant program, Strengthening Human Resources in Developing Countries. Dr. Rosenfield comes to the staff from the World Health Organization (WHO) in Geneva, where from 1978 to 1987 she developed and managed the Social and Economic Research Component of the United Nations Development Program/World Bank/WHO Special Programme for Research and Training in Tropical Diseases.

Sara L. Engelhardt, secretary, is leaving the Corporation to assume the offices of executive vice president and secretary of The Foundation Center on October 1, 1987. Ms. Engelhardt joined the Corporation in 1966 as staff assistant. She was appointed assistant secretary in 1972, associate secretary in 1974, and secretary in 1975. She served on the board of The Foundation Center since 1984 and was chair of its Advisory Committee on Fundraising. The Foundation Center was established with support from Carnegie Corporation in 1956.

RECENT PUBLICATIONS

The following publications are the result of Corporation grants and may be ordered directly from their publishers:

What Americans Think: Views on Development and U.S.-Third World Relations, a Public Opinion Project of InterAction and the Overseas Development Council, prepared by Christine E. Contee (InterAction, New York, $8.95).

Crisis Stability and Nuclear War, a report prepared under the auspices of the American Academy of Arts and Sciences and the Cornell University Peace Studies Program (Peace Studies Program, Cornell University, Ithaca, New York).

Managing Nuclear Operations, edited by Ashton B. Carter, John D. Steinbruner, and Charles A. Zrakat (The Brookings Institution, $39.95 hardcover, $18.95 softcover).

Nuclear Fallacy: Dispelling the Myth of Nuclear Strategy, by Morton H. Halperin (Ballinger Publishing Company, $19.95 hardcover).

Preventing Nuclear Terrorism, The Report and Papers of the International Task Force on Prevention of Nuclear Terrorism, edited by Paul Leventhal and Yonah Alexander (Lexington Books, $56.00 hardcover, $22.95 softcover).

The Science and Technology of Directed Energy Weapons (The American Physical Society, New York).

The DRP: An Effectiveness Measure in Reading, by Bertram L. Koslin, Susan Zeno, and Sandra Koslin (The College Board).

Modern Investment Management and the Prudent Man Rule, by Bevis Longstreth (Oxford University Press, $34.50 hardcover).

The Pharmacologic Treatment of Tobacco Dependence: Proceedings of the World Congress, November 4-5, 1985, edited by Judith K. Ockene (Smoking Behavior and Policy Conference Series, John F. Kennedy School of Government, Harvard University, Cambridge, Massachusetts, $10.00).

CARNEGIE FORUM ON EDUCATION AND THE ECONOMY

At its second annual meeting, held in San Diego, May 14-16, 1987, the Carnegie Forum on Education and the Economy announced the establishment of the National Board for Professional Teaching Standards. The formation of this board was the key recommendation of the Forum's May 1986 report, *A Nation Prepared: Teachers for the 21st Century*. Among the board's activities will be the development of means to evaluate teaching and the issuance of certificates to teachers who meet the board's standards. Thirty-three teachers, government officials responsible for education, members of the public, and others have been appointed to the board, which is chaired by former North Carolina Governor James B. Hunt.

Information: Marc S. Tucker, Executive Director, Carnegie Forum on Education and the Economy, 1320 18th Street, N.W., Suite 401, Washington, D.C. 20036.

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